

## 20705-003seqlisting.TXT

## SEQUENCE LISTING

<110> Serino, Laura  
Leuzzi, Rosanna  
Fontana, Maria Rita  
Monaci, Elisabetta  
Pizza, Mariagrazia

<120> Immunogenic Compositions Comprising Multiple Gonococcal Antigens

<130> PPO020705.0003

<140> US 10/561,235

<141> 2005-12-19

<150> 0315021.6

<151> 2003-06-26

<150> PCT/IB2004/002421

<151> 2004-06-25

<160> 7

<170> SeqWin99, version 1.02

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<213> Neisseria gonorrhoeae

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20 25 30

Asn Lys Ser Ala Met Tyr Gly Leu Gly Gly Ala Ala Val Cys Gly Ile  
35 40 45

Val Gly Ala Leu Thr His Ser Gly Lys Gly Ala Arg Asn Ser Ala Leu  
50 55 60

Ala Cys Gly Ala Ile Gly Ala Gly Val Gly Gly Tyr Met Asp Tyr Gln  
65 70 75 80

Glu Gln Arg Leu Arg Gln Asn Leu Ala Gly Thr Gln Ile Glu Ile Gln  
85 90 95

Arg Gln Gly Asn Gln Ile Arg Leu Val Met Pro Glu Ser Val Thr Phe  
100 105 110

Ala Thr Gly Ser Ala Ala Leu Gly Gly Ser Ala Gln Tyr Ala Leu Asn  
115 120 125

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Thr Ala Ala Gln Thr Leu Val Gln Tyr Pro Asp Thr Thr Leu Thr Ile  
130 135 140

Asn Gly His Thr Asp Asn Thr Gly Ser Asp Ala Val Asn Asn Pro Leu  
145 150 155 160

Ser Gln His Arg Ala Gln Ala Val Ala Tyr Tyr Leu Gln Thr Arg Gly  
165 170 175

Val Ala Ala Ser Arg Leu Thr Val Tyr Gly Tyr Gly Ser His Met Pro  
180 185 190

Val Ala Ser Asn Ala Thr Val Glu Gly Arg Ala Gln Asn Arg Arg Val  
195 200 205

Glu Ile Leu Ile Asn Pro Asp Gln Arg Ala Val Asn Ala Ala Arg His  
210 215 220

Met  
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Ser Phe Thr Met Ile Arg Leu Thr Arg Ala Phe Ala Ala Ala Leu Ile  
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Gly Leu Cys Cys Thr Thr Gly Ala His Ala Asp Thr Phe Gln Lys Ile  
35 40 45

Gly Phe Ile Asn Thr Glu Arg Ile Tyr Leu Glu Ser Lys Gln Ala Arg  
50 55 60

Asn Ile Gln Lys Thr Leu Asp Gly Glu Phe Ser Ala Arg Gln Asp Glu  
65 70 75 80

Leu Gln Lys Leu Gln Arg Glu Gly Leu Asp Leu Glu Arg Gln Leu Ala  
85 90 95

Gly Gly Lys Leu Lys Asp Ala Lys Lys Ala Gln Ala Glu Glu Lys Trp  
100 105 110

Arg Gly Leu Val Glu Ala Phe Arg Lys Lys Gln Ala Gln Phe Glu Glu  
115 120 125

Asp Tyr Asn Leu Arg Arg Asn Glu Glu Phe Ala Ser Leu Gln Gln Asn  
130 135 140

Ala Asn Arg Val Ile Val Lys Ile Ala Lys Gln Glu Gly Tyr Asp Val  
145 150 155 160

Ile Leu Gln Asp Val Ile Tyr Val Asn Thr Gln Tyr Asp Val Thr Asp  
165 170 175

Ser Val Ile Lys Glu Met Asn Ala Arg  
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Glu Pro Ala Ala Ala Ser Ala Ala Gln Gly Asp Thr Ser Ser Ile Gly  
35 40 45  
Ser Thr Met Gln Gln Ala Ser Tyr Ala Met Gly Val Asp Ile Gly Arg  
50 55 60  
Ser Leu Lys Gln Met Lys Glu Gln Gly Ala Glu Ile Asp Leu Lys Val  
65 70 75 80  
Phe Thr Asp Ala Met Gln Ala Val Tyr Asp Gly Lys Glu Ile Lys Met  
85 90 95  
Thr Glu Glu Gln Ala Gln Glu Val Met Met Lys Phe Leu Gln Glu Gln  
100 105 110  
Gln Ala Lys Ala Val Glu Lys His Lys Ala Asp Ala Lys Ala Asn Lys  
115 120 125  
Glu Lys Gly Glu Ala Phe Leu Lys Glu Asn Ala Ala Lys Asp Gly Val  
130 135 140  
Lys Thr Thr Ala Ser Gly Leu Gln Tyr Lys Ile Thr Lys Gln Gly Glu  
145 150 155 160  
Gly Lys Gln Pro Thr Lys Asp Asp Ile Val Thr Val Glu Tyr Glu Gly  
165 170 175  
Arg Leu Ile Asp Gly Thr Val Phe Asp Ser Ser Lys Ala Asn Gly Gly  
180 185 190  
Pro Ala Thr Phe Pro Leu Ser Gln Val Ile Pro Gly Trp Thr Glu Gly  
195 200 205  
Val Arg Leu Leu Lys Glu Gly Glu Ala Thr Phe Tyr Ile Pro Ser  
210 215 220  
Asn Leu Ala Tyr Arg Glu Gln Gly Ala Gly Glu Lys Ile Gly Pro Asn  
225 230 235 240  
Ala Thr Leu Val Phe Asp Val Lys Leu Val Lys Ile Gly Ala Pro Glu  
245 250 255  
Asn Ala Pro Ala Lys Gln Pro Asp Gln Val Asp Ile Lys Lys Val Asn  
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<213> Neisseria gonorrhoeae

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Glu Lys Ile Gly Trp Ile Leu Val Leu Asp Lys Glu Gly Arg Leu Lys  
35 40 45

Thr Val Val Pro Asn Leu Thr Ala Asp Lys Lys Pro Gln Pro Lys Leu  
50 55 60

Met Ser Val Pro Arg Pro Glu Lys Arg Thr Ser Gly Ile Lys Pro Asn  
65 70 75 80

Phe Leu Trp Asp Lys Thr Ala Tyr Ala Leu Gly Val Glu Ala Asn Lys  
85 90 95

Asn Lys Ala Glu Ala Lys Glu Lys Pro Phe Thr Pro Ser Glu Lys Thr  
100 105 110

Phe Glu Ala Phe Lys Gln Tyr His Leu Asp Leu Leu Gln Asn Ser Glu  
115 120 125

Asp Glu Gly Leu Gln Ala Leu Cys Arg Phe Leu Gln Asn Trp Gln Pro  
130 135 140

Ala His Phe Ala Ala Glu Asn Leu Pro Ala Glu Met Leu Asp Ser Asn  
145 150 155 160

Thr Ala Phe Ser Leu Glu Lys Pro Thr Ala Leu Ile His Lys Arg Glu  
165 170 175

Ala Ala Gln Thr Leu Trp Ala Gly Cys Leu Lys Ser Asp Glu Ala Leu  
180 185 190

Glu Ser Leu Cys Leu Ile Ser Gly Asp Thr Ala Pro Ile Ala Arg Leu  
195 200 205

His Pro Ala Ile Lys Gly Val Phe Gly Gly Gln Ser Ser Gly Gly Ser  
210 215 220

Ile Ile Ser Phe Asn Lys Glu Ala Phe Ser Ser Phe Gly Lys Glu Gln  
225 230 235 240

Gly Ala Asn Ala Pro Val Ser Glu Gln Ser Ala Phe Ala Tyr Thr Thr  
245 250 255

Ala Leu Asn Tyr Leu Leu Arg Arg Glu Asn Asn His Cys Leu Thr Ile  
260 265 270

Gly Asp Ala Ser Thr Val Phe Trp Ala Glu Ala Asp Asp Ile Val Asp  
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<212> PRT

<213> Neisseria gonorrhoeae

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 20 25 30

Leu Phe Val Phe Leu Ala Gly Gly Met Leu Met Leu Thr Ala Gln Trp  
 35 40 45

Gln Arg Ala Leu Asn Phe Ala Ser Val Trp Phe Val Val Leu Ile Leu  
 50 55 60

Phe His Arg Leu Lys Ile His Tyr Tyr Lys Gln Pro Leu Leu Ile Ser  
 65 70 75 80

Asp Phe Leu Leu Ile Ala Asp Trp Arg Asn Trp Glu Thr Leu Phe His  
 85 90 95

Tyr Lys Glu Ala Val Ile Gly Met Ala Gly Leu Leu Ala Leu Ala Gly  
 100 105 110

Tyr Ala Val Phe Gly Trp Ser Gly Ala Asp Ser Leu Gly Met Pro Trp  
 115 120 125

Arg Trp Ala Gly Ala Val Leu Phe Ala Ala Ala Phe Val Ser Val Arg  
 130 135 140

His Phe Ser Lys His Pro Gly Ala Val Lys Thr Trp Leu Asp Ser Leu  
 145 150 155 160

Pro Asp Asp Gly Arg Asp Val Phe Leu Asn Leu Pro Met Ser Cys Arg  
 165 170 175

Ala Val Phe Phe Gln Val Pro Val Phe Glu Gly Asp Gly Glu Ala Phe  
 180 185 190

Ala Arg Gln Met Pro Ser Glu Thr Arg Pro Tyr Gly Met Ser Asp Glu  
 195 200 205

Lys Pro Asp Ile Val Val Thr Leu Met Glu Ser Thr Leu Asp Pro His  
 210 215 220

Cys Phe Asp Phe Ala Ala Ala Lys Ile Pro Asp Leu Lys Met Phe Gly  
 225 230 235 240

Arg Gln Glu Asp Thr Val Phe Ser Ser Pro Leu Arg Val His Thr Phe  
 245 250 255

Gly Gly Ala Thr Trp Lys Ser Glu Phe Ala Phe Leu Ala Gly Val Pro  
 260 265 270

Ser Thr Asp Phe Gly Ala Leu Ala Ser Gly Val Phe Tyr Ser Val Val  
 275 280 285

Pro His Leu Gln Thr Gly Phe Val Arg Asn Leu Arg Glu His Gly Tyr  
 290 295 300

Phe Cys Val Ala Leu Ser Pro Phe Thr Lys Gly Asn Tyr Asn Ala Lys  
 305 310 315 320

Ala Ala Tyr Asp His Phe Gly Phe Asn Leu Met Phe Gln Pro Gln Asp  
 325 330 335

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Leu Gly Tyr Pro Ala Pro Met Gly Lys Asn Leu Trp His Ile Ser ser  
340 345 350  
Glu Glu Met Met Gln Tyr Ala Arg Met Ile Leu Glu Lys Arg His Pro  
355 360 365  
Asp Leu Glu Asn Val Arg Gln Pro Met Phe Val Tyr Val Leu Thr Met  
370 375 380  
Lys Glu His Gly Pro Tyr Arg Thr Asp Thr Asp Asn Val Phe Asp Leu  
385 390 395 400  
Asp Ala Pro Asp Leu Asn Ala Lys Thr Val Ser Ala Leu Asn Asp Tyr  
405 410 415  
Ile Gly Arg Ile Ala Asp Leu Asp Lys Ala Val Glu Ser Phe Asp Arg  
420 425 430  
Tyr Leu His Glu Arg Gly Lys Pro Phe Val Phe Gly Tyr Phe Gly Asp  
435 440 445  
His Gln Val Pro Phe Glu Gly Val Ser Val Arg Lys Lys Trp Asp Tyr  
450 455 460  
Ala Gln Pro Asp Tyr Val Thr Gln Phe Ala Val Arg Ser Asn Ile Ala  
465 470 475 480  
Gly Gly Phe Val Gln Arg Gln Asp Phe Leu Asp Leu Ala Phe Ala Gly  
485 490 495  
Gly Val Leu Met Glu Ala Ala Gly Leu Glu Ala Lys Asp Gly Phe Met  
500 505 510  
Arg Ala Asn Met Ala Met Arg Gly Leu Cys Gly Gly Leu Glu Asp  
515 520 525  
Cys Pro Asn Arg Glu Leu Val Gly Asn Tyr Arg Asn Tyr Leu Tyr Asp  
530 535 540  
Val Leu Lys Ile Ala Arg  
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<213> Neisseria gonorrhoeae  
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Ser Phe Gly Ile Leu Pro Gln Ala Arg Ala Gly His Thr Tyr Phe Gly  
35 40 45  
Ile Asn Tyr Gln Tyr Tyr Arg Asp Phe Ala Glu Asn Lys Gly Lys Phe  
50 55 60  
Ala Val Gly Ala Lys Asp Ile Glu Val Tyr Asn Lys Lys Gly Glu Leu  
65 70 75 80

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Val Gly Lys Ser Met Thr Lys Ala Pro Met Ile Asp Phe Ser Val Val  
 85 90 95  
 Ser Arg Asn Gly Val Ala Ala Leu Ala Gly Asp Gln Tyr Ile Val Ser  
 100 105 110  
 Val Ala His Asn Gly Gly Tyr Asn Asn Val Asp Phe Gly Ala Glu Gly  
 115 120 125  
 Ser Asn Pro Asp Gln His Arg Phe Ser Tyr Gln Ile Val Lys Arg Asn  
 130 135 140  
 Asn Tyr Lys Ala Gly Thr Asn Gly His Pro Tyr Gly Gly Asp Tyr His  
 145 150 155 160  
 Met Pro Arg Leu His Lys Phe Val Thr Asp Ala Glu Pro Val Glu Met  
 165 170 175  
 Thr Ser Tyr Met Asp Gly Trp Lys Tyr Ala Asp Leu Asn Lys Tyr Pro  
 180 185 190  
 Asp Arg Val Arg Ile Gly Ala Gly Arg Gln Tyr Trp Arg Ser Asp Glu  
 195 200 205  
 Asp Glu Pro Asn Asn Arg Glu Ser Ser Tyr His Ile Ala Ser Ala Tyr  
 210 215 220  
 Ser Trp Leu Val Gly Gly Asn Thr Phe Ala Gln Asn Gly Ser Gly Gly  
 225 230 235 240  
 Gly Thr Val Asn Leu Gly Ser Glu Lys Ile Lys His Ser Pro Tyr Gly  
 245 250 255  
 Phe Leu Pro Thr Gly Gly Ser Phe Gly Asp Ser Gly Ser Pro Met Phe  
 260 265 270  
 Ile Tyr Asp Ala Gln Lys Gln Lys Trp Leu Ile Asn Gly Val Leu Gln  
 275 280 285  
 Thr Gly Asn Pro Tyr Ile Gly Lys Ser Asn Gly Phe Gln Leu Val Arg  
 290 295 300  
 Lys Asp Trp Phe Tyr Asp Glu Ile Phe Ala Gly Asp Thr His Ser Val  
 305 310 315 320  
 Phe Tyr Glu Pro His Gln Asn Gly Lys Tyr Phe Phe Asn Asp Asn Asn  
 325 330 335  
 Asn Gly Ala Gly Lys Ile Asp Ala Lys His Lys His Tyr Ser Leu Pro  
 340 345 350  
 Tyr Arg Leu Lys Thr Arg Thr Val Gln Leu Phe Asn Val Ser Leu Ser  
 355 360 365  
 Glu Thr Ala Arg Glu Pro Val Tyr His Ala Ala Gly Gly Val Asn Ser  
 370 375 380  
 Tyr Arg Pro Arg Leu Asn Asn Gly Glu Asn Ile Ser Phe Ile Asp Lys  
 385 390 395 400  
 Gly Lys Gly Glu Leu Ile Leu Thr Ser Asn Ile Asn Gln Gly Ala Gly  
 405 410 415

Gly Leu Tyr Phe Glu Gly Asn Phe Thr Val Ser Pro Lys Asn Asn Glu  
 420 425 430

Thr Trp Gln Gly Ala Gly val His Ile Ser Asp Gly Ser Thr Val Thr  
 435 440 445

Trp Lys Val Asn Gly Val Ala Asn Asp Arg Leu Ser Lys Ile Gly Lys  
 450 455 460

Gly Thr Leu Leu Val Gln Ala Lys Gly Glu Asn Gln Gly Ser Val Ser  
 465 470 475 480

Val Gly Asp Gly Lys Val Ile Leu Asp Gln Gln Ala Asp Asp Gln Gly  
 485 490 495

Lys Lys Gln Ala Phe Ser Glu Ile Gly Leu Val Ser Gly Arg Gly Thr  
 500 505 510

Val Gln Leu Asn Ala Asp Asn Gln Phe Asn Pro Asp Lys Leu Tyr Phe  
 515 520 525

Gly Phe Arg Gly Gly Arg Leu Asp Leu Asn Gly His Ser Leu Ser Phe  
 530 535 540

His Arg Ile Gln Asn Thr Asp Glu Gly Ala Met Ile Val Asn His Asn  
 545 550 555 560

Gln Asp Lys Glu Ser Thr Val Thr Ile Thr Gly Asn Lys Asp Ile Thr  
 565 570 575

Thr Thr Gly Asn Asn Asn Leu Asp Ser Lys Lys Glu Ile Ala Tyr  
 580 585 590

Asn Gly Trp Phe Gly Glu Lys Asp Ala Thr Lys Thr Asn Gly Gly Leu  
 595 600 605

Asn Leu Asn Tyr Pro Pro Glu Glu Ala Asp Arg Thr Leu Leu Leu Ser  
 610 615 620

Gly Gly Thr Asn Leu Asn Gly Asn Ile Thr Gln Thr Asn Gly Lys Leu  
 625 630 635 640

Phe Phe Ser Gly Arg Pro Thr Pro His Ala Tyr Asn His Leu Gly Ser  
 645 650 655

Gly Trp Ser Lys Met Glu Gly Ile Pro Gln Gly Glu Ile Val Trp Asp  
 660 665 670

Asn Asp Trp Ile Asp Arg Thr Phe Lys Ala Glu Asn Phe His Ile Gln  
 675 680 685

Gly Gly Gln Ala Val Val Ser Arg Asn Val Ala Lys Val Glu Gly Asp  
 690 695 700

Trp His Leu Ser Asn His Ala Gln Ala Val Phe Gly Val Ala Pro His  
 705 710 720

Gln Ser His Thr Ile Cys Thr Arg Ser Asp Trp Thr Gly Leu Thr Ser  
 725 730 735

Cys Thr Glu Lys Thr Ile Thr Asp Asp Lys Val Ile Ala Ser Leu Ser  
 740 745 750

Lys Thr Asp Val Arg Gly Asn Val Ser Leu Ala Asp His Ala His Leu  
 755 760 765

Asn Leu Thr Gly Leu Ala Thr Phe Asn Gly Asn Leu Val Gln Ala Glu  
 770 775 780

Thr Arg Thr Ile Arg Leu Arg Ala Asn Ala Thr Gln Asn Gly Asn Leu  
 785 790 795 800

Ser Leu Val Gly Asn Ala Gln Ala Thr Phe Asn Gln Ala Thr Leu Asn  
 805 810 815

Gly Asn Thr Ser Ala Ser Asp Asn Ala Ser Phe Asn Leu Ser Asn Asn  
 820 825 830

Ala Val Gln Asn Gly Ser Leu Thr Leu Ser Asp Asn Ala Lys Ala Asn  
 835 840 845

Val Ser His Ser Ala Leu Asn Gly Asn Val Ser Leu Ala Asp Lys Ala  
 850 855 860

Val Phe His Phe Glu Asn Ser Arg Phe Thr Gly Lys Ile Ser Gly Gly  
 865 870 875 880

Lys Asp Thr Ala Leu His Leu Lys Asp Ser Glu Trp Thr Leu Pro Ser  
 885 890 895

Gly Thr Glu Leu Gly Asn Leu Asn Leu Asp Asn Ala Thr Ile Thr Leu  
 900 905 910

Asn Ser Ala Tyr Arg His Asp Ala Ala Gly Ala Gln Thr Gly Ser Ala  
 915 920 925

Ala Asp Ala Pro Arg Arg Ser Arg Arg Ser Leu Leu Ser Val Thr  
 930 935 940

Pro Pro Thr Ser Ala Glu Ser Arg Phe Asn Thr Leu Thr Val Asn Gly  
 945 950 955 960

Lys Leu Asn Gly Gln Gly Thr Phe Arg Phe Met Ser Glu Leu Phe Gly  
 965 970 975

Tyr Arg Ser Gly Lys Leu Lys Leu Ala Glu Ser Ser Glu Gly Thr Tyr  
 980 985 990

Thr Leu Ala Val Asn Asn Thr Gly Asn Glu Pro Val Ser Leu Glu Gln  
 995 1000 1005

Leu Thr Val Val Glu Gly Lys Asp Asn Thr Pro Leu Ser Glu Asn Leu  
 1010 1015 1020

Asn Phe Thr Leu Gln Asn Glu His Val Asp Ala Gly Ala Trp Arg Tyr  
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Gln Leu Ile Arg Lys Asp Gly Glu Phe Arg Leu His Asn Pro Val Lys  
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Glu Gln Glu Leu Ser Asp Lys Leu Gly Lys Ala Gly Glu Thr Glu Ala  
 1060 1065 1070

Ala Leu Thr Ala Lys Gln Ala Gln Leu Ala Ala Lys Gln Gln Ala Glu  
 1075 1080 1085

Lys Asp Asn Ala Gln Ser Leu Asp Ala Leu Ile Ala Ala Gly Arg Asn  
 1090 1095 1100  
 Ala Thr Glu Lys Ala Glu Ser Val Ala Glu Pro Ala Arg Gln Ala Gly  
 1105 1110 1115 1120  
 Gly Glu Asn Ala Gly Ile Met Gln Ala Glu Glu Glu Lys Lys Arg Val  
 1125 1130 1135  
 Gln Ala Asp Lys Asp Thr Ala Leu Ala Lys Gln Arg Glu Ala Glu Thr  
 1140 1145 1150  
 Arg Pro Ala Thr Thr Ala Phe Pro Arg Ala Arg Arg Ala Arg Arg Asp  
 1155 1160 1165  
 Leu Pro Gln Pro Gln Pro Gln Pro Gln Pro Gln Arg Asp Leu  
 1170 1175 1180  
 Ile Ser Arg Tyr Ala Asn Ser Gly Leu Ser Glu Phe Ser Ala Thr Leu  
 1185 1190 1195 1200  
 Asn Ser Val Phe Ala Val Gln Asp Glu Leu Asp Arg Val Phe Ala Glu  
 1205 1210 1215  
 Asp Arg Arg Asn Ala Val Trp Thr Ser Gly Ile Arg Asp Thr Lys His  
 1220 1225 1230  
 Tyr Arg Ser Gln Asp Phe Arg Ala Tyr Arg Gln Gln Thr Asp Leu Arg  
 1235 1240 1245  
 Gln Ile Gly Met Gln Lys Asn Leu Gly Ser Gly Arg Val Gly Ile Leu  
 1250 1255 1260  
 Phe Ser His Asn Arg Thr Gly Asn Thr Phe Asp Asp Gly Ile Gly Asn  
 1265 1270 1275 1280  
 Ser Ala Arg Leu Ala His Gly Ala Val Phe Gly Gln Tyr Gly Ile Gly  
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 Arg Phe Asp Ile Gly Ile Ser Ala Gly Ala Gly Phe Ser Ser Gly Ser  
 1300 1305 1310  
 Leu Ser Asp Gly Ile Arg Gly Lys Ile Arg Arg Arg Val Leu His Tyr  
 1315 1320 1325  
 Gly Ile Gln Ala Arg Tyr Arg Ala Gly Phe Gly Gly Phe Gly Ile Glu  
 1330 1335 1340  
 Pro His Ile Gly Ala Thr Arg Tyr Phe Val Gln Lys Ala Asp Tyr Arg  
 1345 1350 1355 1360  
 Tyr Glu Asn Val Asn Ile Ala Thr Pro Gly Leu Ala Phe Asn Arg Tyr  
 1365 1370 1375  
 Arg Ala Gly Ile Lys Ala Asp Tyr Ser Phe Lys Pro Ala Gln His Ile  
 1380 1385 1390  
 Ser Ile Thr Pro Tyr Leu Ser Leu Ser Tyr Thr Asp Ala Ala Ser Gly  
 1395 1400 1405  
 Lys Val Arg Thr Arg Val Asn Thr Ala Val Leu Ala Gln Asp Phe Gly  
 1410 1415 1420

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Lys Thr Arg Ser Ala Glu Trp Gly Val Asn Ala Glu Ile Lys Gly Phe  
1425 1430 1435 1440  
Thr Leu Ser Leu His Ala Ala Ala Lys Gly Pro Gln Leu Glu Ala  
1445 1450 1455  
Gln His Ser Ala Gly Ile Lys Leu Gly Tyr Arg Trp  
1460 1465